What is claimed is:

1. An apparatus for imbedding a watermark by using a linear prediction analysis, comprising:

a linear prediction analyzing unit for receiving an original signal and detecting a prediction coefficient predetermined through the linear prediction analysis;

a delay unit for receiving the original signal and delaying it by a predetermined time;

a linear prediction analysis filtering unit for filtering the signal delayed in the delay unit by using the prediction coefficient detected in the linear prediction analyzing unit;

a frequency area converting unit for converting the signal outputted from the linear prediction analysis filtering unit into a frequency area signal;

a psychological acoustic modeling unit for receiving the original signal and gaining a masking threshold by employing a psychological acoustic model;

a time-varying adaptation filtering unit for performing a control so that the signal outputted from the frequency area converting unit may have a magnitude approximate to a magnitude of the masking threshold gained in the psychological acoustic modeling unit;

a time area converting unit for changing the signal outputted from the time-varying adaptation filtering unit to a time area signal;

an error correction coding unit for receiving copyright information and providing an error correction function;

a code generating unit for providing a code to the time area signal outputted from the time area converting unit in response to a signal outputted from the error correction coding unit; and

a computing unit for adding and deducting the signal having the code provided from the code generating unit to/from the original signal in response to a corresponding code.

2. The apparatus as recited in claim 1, wherein said linear prediction analyzing unit extracts the prediction coefficient capable of predicting audio peculiar spectrum through the linear prediction analysis.

3. The apparatus as recited in claim 1, wherein said psychological acoustic modeling unit receives the original audio signal and obtains the masking threshold as a threshold capable of sensing audio original sound in a frequency area by employing a psychological acoustic model.

4. The apparatus as recited in claim 1, wherein said delay unit receives the original signal and delays it by a predetermined constant time, and after that, sends the delayed signal to the linear prediction analysis filtering unit, said delayed constant time $\tau$ becoming a key value in a watermark detection.

5. The apparatus as recited in claim 4, wherein said time-varying adaptation filtering unit makes an AR(auto-regressive) filter on the basis of the masking threshold obtained in the psychological acoustic modeling unit, and then, performs a control so that the signal outputted from the frequency area converting unit may be passed through the AR filter and may thereby have a magnitude approximate to the masking threshold.

6. An apparatus for detecting a watermark by using a linear prediction analysis, comprising:

a linear prediction analyzing unit for receiving a signal having an imbedding of a watermark and outputting a prediction coefficient predetermined through the linear prediction analysis;

a linear prediction analysis filtering unit for filtering the signal having the imbedding of the watermark by using the prediction coefficient extracted from the linear prediction analyzing unit;

an autocorrelation acquiring unit for receiving a filtered value outputted from the linear prediction analysis filtering unit and gaining an autocorrelation;

a code detecting unit for detecting a code of a correlation outputted from the autocorrelation acquiring unit; and

an error correction decoding unit for performing an error correction decoding according to a code detection result

value outputted from the code detecting unit and extracting a watermark signal.

7. The apparatus as recited in claim 6, wherein said linear prediction analyzing unit extracts the prediction coefficient capable of predicting audio peculiar spectrum through the linear prediction analysis.

8. A method of imbedding a watermark in a watermark imbedding apparatus using a linear prediction analysis, said method comprising the steps of:

a) receiving an original signal, detecting a prediction coefficient predetermined through the linear prediction analysis, delaying it by a predetermined time, and gaining a masking threshold by employing a psychological acoustic model;

b) filtering the delayed audio signal by using the detected prediction coefficient;

c) converting a value filtered in said second step into a frequency area signal;

d) AR(Auto-regressive)-filtering the frequency area signal by using the masking threshold;

e) converting the signal filtered in said fourth step into a time area signal;

f) generating an error correction code having copyright information and an error correction function, and providing a code to the time area signal according to the error correction code; and

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g) adding and deducting the time area signal to/from the original signal according to the provided code, and producing a signal having an imbedding of the watermark.

5          9. The method as recited in claim 8, wherein in the prediction coefficient detecting step, said prediction coefficient capable of predicting audio peculiar spectrum is detected through the linear prediction analysis.

10          10. A method of detecting a watermark in a watermark detecting apparatus using a linear prediction analysis, said method comprising the steps of:

a) receiving a signal having an imbedding of a watermark, and detecting a prediction coefficient predetermined through
15      the linear prediction analysis;

b) filtering the signal having the imbedding of watermark by using the detected prediction coefficient;

c) measuring an autocorrelation of the filtered signal;

d) detecting a code for the measured correlation; and

20          e) performing an error correction decoding by using the code detection result, and extracting a watermark signal.

11. The method as recited in claim 10, wherein in the prediction coefficient detecting step, said prediction
25      coefficient capable of predicting audio peculiar spectrum is detected through the linear prediction analysis.

12. A record medium capable of being read through a computer having a writing of a program, in a watermark imbedding apparatus having a processor based on a large capacitance, said record medium characterized in that said program contains:

a first function of receiving an original signal, detecting a prediction coefficient predetermined through a linear prediction analysis, delaying it by a predetermined time, and gaining a masking threshold by employing a psychological acoustic model;

a second function of filtering the delayed audio signal by using the detected prediction coefficient;

a third function of converting a value filtered in said second function into a frequency area signal;

a fourth function of AR(Auto-regressive)-filtering the frequency area signal by using the masking threshold;

a fifth function of converting the signal filtered in said fourth function into a time area signal;

a sixth function of generating an error correction code having copyright information and an error correction function, and providing a code to the time area signal according to the error correction code; and

a seventh function of adding and deducting the time area signal to/from the original signal according to the provided code, and producing a signal having an imbedding of a watermark.

13. A record medium capable of being read through a computer having a writing of a program, in a watermark detecting apparatus having a processor based on a large capacitance, said record medium characterized in that said
5    program contains:

a first function of receiving a signal having an imbedding of a watermark, and detecting a prediction coefficient predetermined through a linear prediction analysis;

10    a second function of filtering the signal having the imbedding of watermark by using the detected prediction. coefficient;

a third function of measuring an autocorrelation of the filtered signal;

15    a fourth function of detecting a code for the measured correlation; and

a fifth function of performing an error correction decoding by using the code detection result, and extracting a watermark signal.

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